Delta County

Roadway Design and Construction Standards

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ARTICLE 1 – GENERAL PROVISIONS

1.1 Title

These regulations together with all future amendments shall be known as the "Delta County Roadway and Design Standards" (hereafter called the STANDARDS).

1.2 Purpose

The intent of the STANDARDS is to provide a set of defined procedures for the planning, design, construction, permitting and acceptance of roadways and related facilities. The purpose is to standardize the methods for the administration of the Delta County Road System and public roads under the jurisdiction of Delta County and in a manner consistent with applicable federal, state and local statutes, ordinances and regulations. The STANDARDS identify the minimum requirements necessary to achieve public safety, functional effectiveness, maintainability and desired aesthetics while minimizing environmental impact.

1.3 Applicability

The STANDARDS shall apply to roadway facilities to be constructed within Delta County except where other jurisdictions have direct authority (e.g. Colorado Department of Transportation, an incorporated city, etc.). The STANDARDS shall apply to new construction or improvements to existing assets in the County of Delta. The Board of County Commissioners may grant a variance to the STANDARDS provided the Board finds that such a variance shall not adversely affect public health, safety, welfare and is deemed in the best interests of Delta County.

1.4 Authority

The STANDARDS have been adopted pursuant to the authority conferred within: Article 28 of Title 30; Article 2 of Title 43 and other applicable sections of the Colorado Revised Statutes of 1973, as amended.

1.5 Amendments and Revisions

The STANDARDS may, when deemed necessary, be altered, amended, or revised upon resolution of the Delta County Board of County Commissioners after the appropriate public review.

ARTICLE 2 – ADMINISTRATION

2.1 The County Road System

The Board of County Commissioners will adopt and have on public record a Delta County Road Map showing all roads that have been officially made a part of the County Road System. This map will be updated annually to reflect all additions, deletions and alterations to the County Road System.

2.2 Road System Additions

The Board of Commissioners is authorized by Section 43-2-112, C.R.S. 1973, to layout, widen, or change any County road and to acquire lands of private persons for County roads. The Board also has authority to accept, deny, transfer, or cease responsibility for the maintenance of roads. Delta County has staff responsibility for planning, designing, right-of-way acquisition/dedication, construction, inspection and recommendation for acceptance of maintenance responsibilities.

2.2.1 Planning

The planning or layout of a new road shall be subject to the review of the Delta County Planning Department, the County Engineering Department and is subject to the approval of the BOCC. If a road is created through the subdivision process, all provisions of the Delta County Subdivision Regulations shall be met.

2.2.2 Design

The design of any new road shall be in accordance with Design Standards article of the STANDARDS. Road plans and specifications provided to the County shall be certified by a professional engineer licensed to practice in the State of Colorado. Plans and specifications are subject to the approval of the Board of County Commissioners. A written statement from Delta County of the plan approval will validate the submitted plan as acceptable and allow activity to proceed from the planning to the construction phase of activity. Plan approval shall remain valid for two (2) calendar years from plan approval date unless specifically noted otherwise within the STANDARDS and will expire without notice.

2.2.3 Right-of-Way Dedication/Acceptance

A road created through the subdivision process shall have a specified right-of-way width shown on the plat along with a dedication statement. Acceptance of the plat by Delta County constitutes acceptance of the right-of way, but does not constitute acceptance of the road for maintenance. A public road right-of way may also be deeded to the County outside of the subdivision process.

Any right-of way conveyed by deed shall meet the same standards as right-of ways created through the subdivision process as required by the Delta County Subdivision Regulations and the STANDARDS. Acceptance of the deed by Delta County constitutes acceptance of the right-of way but does not constitute acceptance of the road for maintenance.

A road does not become accepted for maintenance and part of the County Road System until it is constructed according to the STANDARDS, inspected and specifically accepted for maintenance by resolution of the Board of County Commissioners.

2.2.4 Inspection

Inspections and the review of test results shall be performed by the County to ensure compliance to the STANDARDS. The inspection process will be the basis for a recommendation to the Board of County Commissioners for or against acceptance and release of performance guarantees. Requirements for inspection and testing are contained in the STANDARDS and the STANDARDS appendices and are the sole responsibility of the developer.

2.2.5 Acceptance of Public Roads for Maintenance

Roads within the jurisdiction of Delta County may be accepted for maintenance by the Board of County Commissioners by resolution. The County shall require a warranty period of a minimum of two (2) years after the date of County acceptance for construction as part of the acceptance process. After that period, the roadway may become a candidate of consideration for acceptance of maintenance. Upon request, the County will inspect the roadway and notify the Applicant in writing of any necessary repairs. All such repairs shall be completed by the Applicant prior to acceptance of the road for maintenance by Delta County. Should the repairs be of a significant nature as determined by the County Engineer, the warranty period shall be extended up to but no more than two additional years, based on the nature and severity of the repairs. The extended warranty period will begin at the time the repairs were accepted for construction. At the concluded time period, the acceptance process shall be repeated.

A road shall only be considered for County maintenance after all of the following requirements are met:

a. A designated County Inspector has inspected the road in accordance with the Construction Policy Standards article of the STANDARDS and the County has recommended acceptance for maintenance.

b. The road connects to another maintained County road, state highway or municipal road.

c. If within a subdivision, the road terminates at an intersection or is constructed with an approved turnabout feature.

d. All required road signs and traffic control devices have been installed in accordance with the STANDARDS and the MUTCD (Manual on Uniform Traffic Control Devices).

e. All required subsurface utilities have been installed in the roadway prior to finishing the subgrade. All laterals crossing the roadway have been installed prior to the road inspection.

f. All survey monuments that were in a roadway or a road right-of-way have been reestablished by a surveyor licensed in the State of Colorado.

g. An acceptable copy of reproducible, as-built drawings have been submitted to the County Engineer. A complete file copy of as-built drawings in an acceptable AutoCAD dxf file format, or of a compatible nature, have been submitted to the County Engineer. Reference Appendix Two, Documentation Requirements for drawing expectations. The drawings will accurately show all road construction details, utility and lateral locations and depths, property boundaries and corners, and other pertinent information as required. Upon its submission to the County Engineer, the copies become and remain the property of the County.

2.3 Permit Requirements

Any and all work performed within a County right-of-way shall require a permit from Delta County. No work shall commence in a county right-of-way prior to the applying and obtaining approval of a County work permit. The permitting process is initiated through the Delta County Planning Department.

The Applicant shall obtain approval at least forty-eight (48) hours – in a regular business hour period (Monday through Friday, holidays excluded), prior to any commencement of construction. Construction involving road closures must have approval at least seven (7) days prior to commencement of construction.

2.4 Road System Impacts

Upon review of a proposed development plan, the Board of County Commissioners may determine that due to the nature or magnitude of the development, the imposition of an impact fee would be justified. Any required impact fees for all traffic generating types of development adopted in lieu of improvements to road system shall be calculated in an amount proportional to the need or demand generated by the proposed development, as determined by one or more studies commissioned and approved by the Board of County Commissioners. The impact fee shall be the sole responsibility of the Developer.

2.5 Public Use - Privately Maintained Roads

Delta County shall assume no maintenance responsibility on public use - privately maintained roads provided however, the County may become a party to a maintenance agreement in which the rights and responsibilities of the parties will be defined by a contractual arrangement subject to review and approval of the Board of County Commissioners.

The County shall assume no oversight or maintenance of utilities on a public use - privately maintained road.

The County shall have no responsibility regarding the use of a public use - privately maintained roads by emergency, postal delivery, or school pickup services. The party responsible for the maintenance and oversight of the roadway has sole responsibility for the arrangement of these services.

The County shall assume no responsibility regarding the maintenance of traffic devices and signage on a public use - privately maintained roads. The party responsible for the maintenance and oversight of the roadway shall maintain all traffic devices and signage of the roadway.

2.6 Private Roads

Delta County shall assume no maintenance responsibility on private roads; provided however, the County may become a party to a maintenance agreement in which the rights and responsibilities of the parties will be defined by a contractual arrangement subject to review and approval of the Board of County Commissioners.

The County shall assume no oversight or maintenance of utilities on private roads.

The County shall have no responsibility regarding the use of a private road by emergency, postal delivery, or school pickup services. The party responsible for the maintenance and oversight of the roadway has sole responsibility for the arrangement of these services.
The County shall assume no responsibility regarding the maintenance of traffic devices and signage on a private road. The party responsible for the maintenance and oversight of the roadway shall maintain all traffic devices and signage of the roadway.

ARTICLE 3 – ROADWAY FUNCTIONAL CLASSIFICATION

3.1 Delta County Roadway Classifications

The Colorado Department of Transportation (CDOT) has classified all roads within Delta County in conformance with Highway Functional Classification Concepts, Criteria, and Procedures by the United States Department of Transportation, Federal Highway Administration (FHWA). Delta County believes it to be in the best interest of the public at large for Delta County's functional classification system and classification of each road to be as consistent as possible with the CDOT classification system. With these considerations as well as those determined by the specific needs of the County, the County shall classify all roads in Delta County and incorporate the results into the Delta County Roadway Functional Classification System and Delta County Roadway Functional Classification Map. The Study and Map will be periodically revised and updated.

3.2 Functional Classifications

The functional classifications used in Delta County are stated below (Also See Appendix 3). While these classifications follow Federal Highway Administration (FHWA) guidelines, some adaptation has been applied to better reflect circumstances in Delta County. As such, the classification of Principal Arterial road systems found below would be equivalent to the FHWA defined subcategory of Other Principal Arterial. Delta County does not have nor foresee the possibility of roadways in the FHWA Interstate subcategory.

Likewise, the nature of Delta County's road system does not warrant the need to distinguish between a Minor and a Major Collector road. The STANDARDS will simply refer to these FHWA classifications as Collector roads. However, Delta County is served by a large number of roads that would fall under the Local Road classification. To better manage this category, Local Roads will be broken up into Local Access Roads and Local Service Roads.

Functional classifications can be further qualified by descriptions such as urban, small urban, or rural (example – urban collector road). The overwhelming majority of the roads within the jurisdiction of Delta County belong to the rural qualification.

Other descriptions, such as scenic byway, commercial, or industrial may be used when such designations better define the nature of the road use which may impact road design requirements. Surface descriptions (paved, gravel, etc.) provided with the road classification are the requirements for new construction and may not reflect surface conditions for existing roadways.

a. Principal Arterial (Paved)
Residential, commercial, and recreational traffic of significant economic importance to the County; characterized by corridor traffic movement with maximum emphasis on mobility. (example: U.S. Highway 50)

U.S. Highway 50 and State Highway 92 from U.S. Highway 50 to State Highway 65 will, by definition, be classified as Principal Arterials for County purposes.

b. Minor Arterial (Paved)
Residential, commercial and recreational traffic of significant economic importance to the County; characterized by traffic movement of a town to town nature emphasizing mobility. (example: Crawford Road)

All remaining State Highways not defined as Principal Arterial roadways will fall in the category of Minor Arterial roads for County purposes.

c. Collector (Paved)
Residential, commercial and recreational traffic of significant economic importance to the County; characterized by providing traffic movement connections from Local roadways to Arterial roadways while sharing emphasis on mobility with land access. (example: F Road, east and west of Delta)

d. Local Access Road (Paved)
Primarily residential or agricultural use; characterized by traffic movement with maximum emphasis on land access from abutting properties to Collector roadways. (example: H 75 Road, east of Delta)

e. Local Service Road (Paved or Gravel)
Primarily residential or agricultural use; characterized by traffic movement solely intended for land access from abutting properties to Local Access or Collector roadways, typically from isolated sites with little potential for future development. (example: Sorrento Lane, east of Cedaredge)

f. Primitive Roads (Native Surface)
Limited or seasonal use only. Historical or rudimentary roads – rough, narrow and typically used for recreational access or possibly commercial uses. (example: Old Grand Mesa Road)

g. Public Use – Privately Maintained (Paved or Gravel)
Not a true functional classification but rather a special circumstance of roadway which would fall under one of the above functional classifications. Primarily residential or agricultural use; characterized by private party responsibility of the roadway.

As a Public Use – Privately Maintained roadway, allowance will be shown for specific parameters, such as the road construction design, which if constructed to would be substandard to those for a county road. As such, the Public Use – Privately Maintained Road , though permitted for construction, would not be considered for acceptance of maintenance due to its substandard nature. See the STANDARDS section regarding Public Use - Privately Maintained for further elaboration.

Should a Public Use – Privately Maintained Road at some later time wished to be considered for acceptance, the County would be contacted with a request for consideration and the acceptance process and requirements shall be the same as defined in the STANDARDS for the appropriate road functional classification.

h. Private Road (Paved or Gravel)
Not a true functional classification but rather a special circumstance of roadway which would fall under one of the above functional classifications Primarily residential or agricultural use; characterized by private party responsibility of the roadway. See the STANDARDS section regarding Private Roads for further elaboration.

3.3 Terrain Classifications

Terrain in Delta County can be characterized within one of the three following categories:

a. Level Terrain
Level terrain is that condition where road sight distances, determined by both horizontal and vertical restrictions, are generally long or can be made so with minor terrain alteration. This would be characterized by an average natural cross slope of less than eight (8) percent.

b. Rolling Terrain
Rolling terrain is that condition where the natural slopes consistently rise and fall below the road grade line and where occasional steep slopes offer restriction to normal horizontal and vertical alignment. This would be characterized by an average natural cross slope from eight (8) to fifteen (15) percent.

c. Mountainous Terrain
Mountainous terrain is a condition where longitudinal and transverse changes in elevation of the ground with respect to the road are abrupt and where the roadbed is obtained by frequent benching or side hill excavation. This would be characterized by an average natural cross slope in excess of fifteen (15) percent.

ARTICLE 4 – DESIGN STANDARDS

4.1 General

This section describes the geometric requirements for each road classification. This section also covers subjects such as driveway entrances, pavement transitions and design, roadway structures, construction and other design factors. Almost all requirements are based on safety considerations. Therefore, these standards should be considered the minimum or of the lowest limit of design acceptability.

4.1.1 Design Period Criteria

Geometric designs shall be based on estimated traffic volumes projected 20 years into the future. All collector and arterial roads shall be designed to provide a level-of-service C or better throughout the 20 year design period. Local roads may be designed to a level-of-service D or better throughout the 20 year design period. Reference ITE (Institute of Transportation Engineers) Standards for traffic volume and AASHTO (American Association of State Highway and Transportation Officials) Standards for level-of-service guidelines.

4.1.2 Policy on the Use of Standards

The policies set forth in the STANDARDS in conjunction with the following standards shall establish acceptable guidelines for roadway design. When standards differ, the instruction in the STANDARDS shall govern.

a. AASHTO Standards

The American Association of State Highway and Transportation Officials (AASHTO) has published policies on highway practice. These are approved references to be used in conjunction with this Section. AASHTO policies represent nationwide standards, which do not always satisfy local conditions.

b. MUTCD

All traffic control devices and road striping must be in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) prepared by the U.S. Department of Transportation.

c. ITE Standards

All traffic generation estimates shall be in accordance with the publication Trip Generation by the Institute of Transportation Engineers.

d. CDOT Standards

Unless otherwise specified herein or specifically modified herein, the Colorado Department of Transportation M & S Standards and Specifications for Road and Bridge Construction shall control the design and construction of roadway improvements or details not specifically covered by the STANDARDS.

4.2 Design Speed

The design of geometric features, such as horizontal and vertical curves, will depend upon the design speed selected for the road. The choice of the design speed is primarily determined by the road functional and terrain classification. The design speed is the maximum speed for safe operation of a vehicle that can be maintained over a specific section of road when conditions are so favorable that the design features of the road govern. Design speeds for the various classifications of roads may be found in Appendix 3, Tables and Charts.

4.3 Geometric Standards

4.3.1 Horizontal Curves

Horizontal alignment should provide for safe and continuous operation of motor vehicles at uniform design speed for substantial lengths of road. A horizontal curve is required when the angle of change in horizontal alignment is equal to or greater than one degree. The minimum radius of curvature will be determined by the design speed or by the stopping sight distance. For further details, see the AASHTO publication A Policy on Geometric Design of Highways and Streets.

a. Standards for Curvature

The table that follows shall require the minimum radius of curvature for each of several selected design speeds with and without a superelevation of 0.02 ft/ft. Wherever possible, the radii used in the design should be larger. If stopping sight distance conditions require a larger radius than one shown in the following table, then the larger radius shall be used. All listed radii are to the centerline.

Minimum Road Curve Radii (ft)

Design Speed (mph)	Normal Crown Road minimum radius (ft)	0.02 ft/ft Superelevation Road minimum radius (ft)
20	125	105
25	250	180
30	400	310
35	600	450
40	850	650
45	1,100	850
50	1,400	1,050
55	1,800	1,350
60	2,200	1,650
65	2,700	2,000

b. Reduced Design Speed on Curves

The reduction of a road design speed on a curve should be avoided. However, where physical restrictions prohibit increasing the radius of the curve or the clear distance, the design speed for the curved section may be reduced. The difference between the design speed for the roadway approaching the curve and the design speed for the curve shall not be greater than 10 MPH. In such circumstances, road signs in accordance with the MUTCD guidelines shall be required.

c. Superelevation in Curves

Superelevation rates of 0.02 ft./ft may be used on all functional classifications of roads. The following table shall set the maximum superelevation rates:

Maximum Superelevation Rates

Road Classification	Rural Road e (ft/ft)	Urban Road e (ft/ft)
principal	.08	.06
minor arterial	.08	.06
collector	.06	.04

The superelevation transition should be based upon the superelevation rate and the width of rotation. The axis of rotation is generally about the pavement centerline. One-third (1/3) of the superelevation transition should be on the entrance and exit of the curve itself while two-thirds (2/3) of the transition should be on the adjacent tangent sections.

The superelevation rate will impact minimum curve radius values, allowing a smaller design radius for a greater superelevation rate at a given design speed. Reference the AASHTO publication A Policy on Geometric Design of Highways and Streets for guidance.

d. Other Design Factors for Curves

For central angles smaller than one degree, no curve is required. In no event shall sight distance or other safety considerations be compromised when a curve is not provided.

A compound curve is two curves of the same direction with different radii joined with no tangent between them. Compound curves shall not be permitted. Reference Appendix 3, Tables and Charts for minimum tangential distances between two curves of the same direction.

A broken-back curve is two curves in the same direction joined by a short tangent. Broken-back curves shall not be permitted.

A reverse curve is two curves in opposite directions joined directly together or with a short tangent between them. Reverse curves shall not be permitted. Reference Appendix 3, Tables and Charts for minimum tangential distances between two curves of the opposite direction.

Spiral curves provide a radial transition upon the lead in and lead out to a circular curve. When properly designed, they assist in vehicular control for negotiating a curve. The use of spiral curves should be considered when road design speed warrants its use – generally thought to be design speeds in excess of 30 mph.

4.3.2 Vertical Alignment

Change in the vertical alignment or grade of a road is necessary for many reasons, including changes in topography, drainage requirements and aesthetic factors. A vertical curve is required when a grade change equal to or greater than 2.0% occurs. All sections of a road's vertical alignment shall meet stopping and passing sight distance requirements for the design speed established for the road. When considering alternative grade profiles, economic and aesthetic comparisons should be made. For further details, see the AASHTO publication A Policy on Geometric Design of Highways and Streets.

a. Minimum and Maximum Grades

To provide for adequate drainage, the minimum sustained grades shall be no less than 0.5 percent on roadway sections with curb and gutter and one (1%) percent on all other roads.

Maximum permissible sustained grades for new roads are related to design speed and shall be as follows:

Maximum Allowable Grades vs. Design Speed

terrain classification	15 mph	20 mph	25 mph	30 mph	40 mph	50 mph	60 mph
flat or rolling	6%	6%	6%	6%	6%	5%	4 %
mountainous	11%	10%	9%	9%	8%	6%	na

The maximum design grade should be used infrequently rather than as a value to be used in most cases. For short grades less than three hundred (300) feet, the maximum gradient may be increased by one percent.

b. Vertical Curves

Regarding vertical curve design, a parabolic vertical curve is to be used. Item 6 in Appendix 3 gives all the necessary mathematical relations for computing a vertical curve, either crest or sag.

4.4 Sight Distance

Sight distance is the continuous length of road ahead that is visible to the driver. In design, two sight distances are considered: passing sight distance and stopping sight distance. Stopping sight distance is the minimum sight distance to be provided at all points on multi-lane roads and on two-lane local roads where passing sight distance is not required. Stopping sight distance shall also be provided for all elements of intersections at grade including private road connections.

Passing sight distance is the minimum sight distance that must be available to enable the driver of one vehicle to pass another vehicle safely and comfortably, without interfering with the speed of an oncoming vehicle traveling at the design speed if it came into view after the passing maneuver is started.

When items such as walls, buildings, bridge piers, cut slopes or vegetation growth are near the roadway on the inside of a curve, they can block a driver's view of the road ahead. If they are too close, the driver will not have sufficient distance along the curved roadway to stop when a hazardous condition comes into view.

Minimum permissible stopping sight distances for new road designs shall be as follows:

Minimum Stopping Sight Distance

Design Speed (mph)	Minimum Sight Distance Stopping (ft)	Minimum Sight Distance Passing (ft)
20	125	800
25	155	950
30	200	1,100
35	245	1,300
40	300	1,500
45	370	1,650
50	450	1,850
55	545	1,950
60	645	2,100
65	750	2,300

Also see Appendix 3 for Stopping Sight Distance on horizontal and vertical curves.

Basic considerations regarding these sight distances are covered in the AASHTO Publication, A Policy on Geometric Design of Highways and Streets.

4.5 Cross Section Standards

4.5.1 Cross Section Slopes

The typical road cross sections are found between road intersections where there are no dip sections for drainage flow across the road. Undivided roads should have a normal crown that is a two-way cross slope with the cross section high point on the road centerline. Divided roads should have a cross slope on each pavement section with the high point of each section on the edge of the pavement nearest the median. Unusual conditions may cause cross slope requirements to vary, but normally the cross slope shall be in accordance with the following:

Standards for Pavement Cross Slopes

Surface Material	Slope (%)
Concrete	2.0
Bituminous Mix Pavement	2.0 – 2.5
Gravel	2.0 – 3.0

Reference Appendix 4 and Appendix 5 for the standard details on cross section design for all functional road classifications.

4.5.2 Road Right-of-Way

The basic minimum right-of-way width for each road classification is specified in the table below. Right-of-way widths in excess of the standard width may be required in special circumstances such as when:

- Cut or fill slopes cannot be confined within the standard width;

- Minimum sight distance lines on horizontal curves are not within the STANDARDS;

- Minimum sight distances at intersections are not within the STANDARDS;

- Additional right-of-way is required to accommodate storm water drainage facilities;

- Additional right-of-way is required for snow removal or storage;

- Additional right-of-way is required to accommodate roads designated as scenic by- ways.

Cross Sectional Road Design Criteria by Functional Classification

Classification	Surface	Minimum ROW (ft)	Lane Width (ft)	Shoulder** Width (ft)
principal arterial	paved	120	12	8
minor arterial	paved	100	12	6
collector	paved	80	12	4
local access road	paved	60	10	2
local access road privately maintained*	paved or gravel	60	7.5	2
local service road	paved or gravel	60	10	2
local service road privately maintained*	gravel	60	7.5	2
primitive road	native	n/a	n/a	n/a

* a public use – privately maintained roadway

** Roads above 7,000 feet in elevation may require additional shoulder width and /or right of way for snow storage at the determination of the County.

The basic minimum right-of-way distance shall not incorporate, in part or as a whole, any previously existing right-of-way without the review and approval of the County. Existing right-of-ways for above ground structures, such as irrigation canals, utility lines, and railroad travel ways should not be incorporated toward part of the roadway right-of-way design and are to be considered in addition to requirements for the roadway right-of way.

4.5.3 Border Areas

All Public Roads as well as any Private Roads which have been initiated through the subdivision process shall have an offset of a minimum of eight (8) feet to establish a border area between the beginning of a construction cut or fill of a roadway feature and a boundary feature.

A roadway feature would include drainage, shoulder or traveled surface structures.

The boundary feature for a Public Roadway will be the line defining the right of way. For a Private Road, the boundary feature will be a property line.

Border area restrictions shall apply to the full length of Public or Private Roads.

4.5.4 Construction Involving Significant Cuts or Fills

Significant cuts or fills will be defined as a horizontal change of terrain by three (3) feet or more.

All cut and fill features shall have a side slope profile limited to a range of 1.5:1 thru 3:1 and is dependent on the soil conditions at the site. Proper side slope definition shall be subject to the approval of the County Engineer.

Side cut profiles may include features such as retaining walls where there are limitations on road cross sectional width. These designs shall be subject to the County Engineer's approval.

All Private Roads and Driveways initiated through the subdivision process which have designs involving significant cuts or fills in terrain shall be subject to side slope profile restrictions which will apply to the full length of the Private Road or Driveway.

4.6 Roadway Drainage

The primary objective of drainage design is the protection of County roads and property while minimizing possible flood damage to surrounding properties and structures. It should be emphasized that good drainage is one of the most important factors in road design. It preserves the appearance as well as the level of service of the road while minimizing maintenance costs.

Culverts under all roads shall be designed to accommodate a 25-year frequency factor for storm run-off utilizing the maximum head. The maximum available head should be determined by the uppermost ponding elevation chosen to prevent flood damage to upstream properties.

Inlets and other facilities draining the road surface shall be designed to accommodate the 10-year frequency factor for storm run-off. All roads shall remain free of ponding.

All drainage installations shall be designed to allow free unobstructed passage of debris and silt or provide for their deflection and/or collection at a point upstream in a manner that will not create an expensive maintenance problem. Settlement basins shall be provided when excessive silting may create a problem downstream.

Modification of natural channels or transferring run-off from one basin to another is not allowed except where no reasonable alternative exists and where the proposal has been reviewed and approved by the County.

Drainage installations shall not introduce standing bodies of water or environments which will be a contributing factor for insect breeding. Any environment that would contribute to the possible spread of the West Nile Virus must be mitigated.

4.6.1 Drainage Determination

The following methods shall be acceptable to determine peak flow rates. A written explanation as to why the particular method was selected shall be required as part of the drainage report.

a. Rational Method

$$Q = CiA_d$$

where: Q = run-off, ft^3/sec
C = a "run-off" coefficient expressing the ratio of rate of run-off to rate of rainfall
i = intensity of rainfall, in/hr, for a duration equal to the time of concentration
A_d = drainage area, acres

Coefficients for the Rational Method Formula are given below. Rainfall intensity is obtained from records of nearby weather stations in the form of graphs showing rainfall intensity in relation to rainfall duration for various recurrence intervals. Selection of the value for rainfall intensity is based on estimates of the acceptable frequency of occurrence and on the time of concentration for the area. The latter is the time required for water to reach the outlet from the most remote point in the basin. The Rational Method should be restricted to use for areas less than 100 acres located in a drainage basin of less than 200 acres.

Coefficients of Run-Off*

Type of Drainage Area	C
Concrete or Bituminous Pavement	0.8 - 0.9
Gravel Roadways	0.4 - 0.6
Bare Earth (high values for steep slope)	0.2 - 0.8
Turf Meadow	0.1 - 0.4
Cultivated	0.2 -0 .4
Forest	0.1 - 0.2

*Coefficients are for storms of 5 to 10 frequencies. Less frequent, higher intensity storms will require higher coefficient values.

b. Soil Conservation Service Method

Soil Conservation Service (SCS) Method. The SCS method was developed particularly for agricultural watersheds. This widely used method is applicable to the mountainous regions on areas from two hundred (200) acres up to ten square miles, and above 6,000 feet in elevation. The method is presented in Procedures forDetermining Peak Flows in Colorado (U.S. Department of Agriculture, Soil Conservation Service, 1980)

c. Soil Conservation Service (SCS) Unit Hydrograph Method and SCS Tabular Hydrograph Method

In most drainage basins, rainfall runoff data from which unit hydrographs can be derived is unavailable, thus a synthetic unit hydrograph must be developed. The USDA (U.S. Department of Agriculture) Soil Conservation Service has developed a method of hydrograph syntheses which is now being widely used. The Tabular Hydrograph Method provides a tabular approach to estimating peak discharges from urban areas using the time of concentration and travel time. This method can readily predict the increase in peak flow when all or a portion of the watershed is to be developed.

d. Regional Analysis

A statistical or regional approach appears to be most appropriate for those areas in Delta County where peak flows occur from seasonal snow melt**.** Run-off from stream records would be necessary for this method.

4.6.2 Culverts

The culvert should slope downward in the direction of natural flow and be designed to be self-cleaning whenever possible. The outlet should be designed not to discharge on unprotected fills or unstable material or at adverse angles to streams or open channels. Headwall, riprap, or other means of protection are required at inlets or outlets where erosion might occur.

Reinforced concrete, corrugated metal pipe, or acceptable polymer pipe as specified by the M & S Standard Specifications for Road and Bridge Construction, CDOT, shall be considered acceptable materials for culvert construction. Steel pipe shall be galvanized and polycoated or paved where soils are corrosive or other conditions exist that may attack the steel. The minimum diameter for round pipe shall be 12 inches. Reference Appendix 4, Modifications to CDOT Specifications for more information.

Polymer pipe culverts shall not be allowed in areas where the practice of ditch burning does or can occur.

For design purposes, a single pipe is preferable to a battery of drainage pipes. When a battery of pipes is permitted by the County Engineer, a clear spacing of 1/2 the pipe diameter (1 foot minimum, 4 foot maximum) must be provided between pipes. Minimum and maximum cover, pipe metal gauge, and strength classification shall be as specified in M 603-1 (CDOT) Metal Culvert Pipe.

4.6.3 Open Channels and Ditches

Channels and ditches are to be designed to avoid roadside safety hazards. The minimum flow line slope shall be 2% if the channel is paved and 3% for channels of other materials. Maximum slopes shall be controlled by the maximum permissible velocities given in the table below. Greater velocities of flow shall require appropriate channel protection.

Mannings equation shall be used to estimate velocities:

$$v = \frac{1.486\, R^{2/3}\, S^{1/2}}{n}$$

where: v = velocity of flow in channel in feet per second
n = roughness coefficient
R = hydraulic radius in feet
S = slope in feet per foot

Maximum Permissible Velocities

Channel Material	n	Velocity (ft/sec)
Slit	.025	2.0
Sand	.030	2.5
Smooth, Stiff Clay	.025	4.0
Fine Gravel	.035	3.5
Coarse Gravel	.040	4.5
Small, Sharp-edges Rocks	.070	6.0
Cobbles and Shingles	.060	6.0
Shales and Hardpans	.030	6.0

4.6.4 Subsurface Drainage

Sub-grades subject to poor drainage, underground seepage or a high water table shall be adequately drained for roadbed stabilization. Drains must be installed to prevent the high ground water level from coming within 4 feet of the roadway pavement. Perforated pipe should always be used to carry away collected water. Gravel drains which contain no pipe are unsatisfactory.

4.6.5 Use of Cross Pans at Road Intersections

Proper drainage shall be part of every intersection and access design. In this regard, cross pan drainage can be considered part of a proper drainage design. However, cross pans shall not be used across roads in the following types of intersections:

Arterial – Arterial
Arterial – Collector
Collector – Collector

The gutter profiles for arterial roads and collector roads should be designed with sag curves or sump conditions located as far away from the intersection as practical. This will allow the interception or removal of light storm water and nuisance water, with only the larger flows still reaching and passing through the intersection.

Where cross pans are allowed, they shall be designed and constructed in accordance to the Colorado Department of Transportation M Standards. In no case will cross pans be less than 8 feet in width at road intersections on the stop-controlled road, nor less than 12 feet in width for all other locations.

4.6.6 Cross Section in Road Dip Sections

Where storm drainage runoff flows must cross the road, dip sections are required. The pavement through the dip section, to carry the flow, shall have a one-way slope (no crown) and curbing and medians must not be raised. Transitions back to normal road cross slopes shall be at both ends of the dip section.

4.6.7 Drainage on Superelevated Curves

Whenever superelevation is allowed on a divided road, a storm drainage system to collect the runoff along the median curb shall be provided. In no case shall nuisance water from the higher traveled way be allowed to cross over the lower traveled way.

4.7 Bridges

For the purposes of this section, the term bridge will mean any structure designed for the purpose of allowing a road to cross over any waterway having a span of 4 or more feet. This will include box culverts and pipe culverts 48 inches or larger in diameter

All bridge structures to be constructed within the public right-of-way shall be designed by a professional engineer licensed in the State of Colorado and qualified to perform such work. All bridge designs will be in accordance with the Standard Specifications for Highway Bridges adopted by AASHTO, latest edition, and the Colorado Department of Transportation's design and detail memos. Design loading for all bridge structures within a public right-of-way shall be HS 20-44, unless otherwise specified.

Plans are to be prepared by a qualified structural engineer and submitted to the County Engineer for review and approval. Clear deck width shall accommodate the full width of the traveled lanes and shoulders of approach roads. Bridges shall be designed with a minimum of one foot freeboard. Additional freeboard shall be required when debris-laden flows are anticipated.

Pedestrian walkways and railings shall be required as warranted. Flared approach railings shall be used on all bridges when guard rails are necessary and shall be installed at both the entrance and exit portions of the railing. Reference the Guard Rails section in the STANDARDS for more information.

4.7.1 Bridge Hydraulic Capacity

The required minimum hydraulic capacity for bridges shall be determined using a design storm frequency based on the following criteria (Q_{50} = peak flow from a 50 year storm event):

Storm Frequency Design Determination

Road Functional Classification	Q_{50}	Storm Frequency (years)
principal arterial	–	100
minor arterial	–	100
collector - urban	–	100
collector - rural	> 4000 cfs	50
collector - rural	< 4000 cfs	25
local	> 4000 cfs	50
local	< 4000 cfs	25

4.7.2 Bridges Within FEMA Designated Flood Hazard Areas

For any structure to be located within a FEMA (Federal Emergency Management Agency) designated flood hazard area, documentation will be submitted by the design engineer demonstrating that no increase in the 100-year flood elevation will occur due to the structure. Documentation will include a Hec 2 analysis and an approved flood hazard area development permit.

4.8 Intersections

4.8.1 Intersection Alignment and Profile

Intersections occurring on horizontal or crest vertical curves are undesirable from the standpoint of operation and sight distance. When there is latitude in the selection of intersection locations, vertical or horizontal curvature should be avoided. A line or grade change is frequently warranted when major intersections are involved. If a curve is unavoidable, it should be as flat as site conditions permit.

Restriction Distances for Profile and Alignment

Intersecting Roadway	Local Service (feet)	Local Access (feet)	Collector (feet)
Driveway	20	30	40
Local Service	30	40	40
Local Access		50	60
Collector			80
Private Road	see note*		

* note – the functional classification based on the road design and purpose will define the restrictions for this type of road. The majority of Private Roads tend to fall under the Local Service classification.

Where the grade of the intersecting road in flat or rolling terrain is greater than 4%, flattening through the intersection shall be required. Reference the included table regarding the minimum distance of the restriction based on the functional road classification. The grade shall be maintained to 4% or less for the distance as measured from the edge of the traveled surface of the intersected road.

Grades greater than 4% which can not be reasonably addressed through excavation or relocation may be permitted only if approved by the County.

In mountainous terrain, the maximum value up to 6% grade will be allowable, with all other stipulations for grade at an intersection being the same as for flat and rolling terrain.

Regardless of the roadway description, including Private Roads and Driveway accesses, the grade of the intersecting road shall slope downward and away from the through road at the same rate as the normal cross slope of the intersected road or 2%, whichever is more suitable, and for a distance of no less than 10 feet from the edge of the traveled way.

4.8.2 Angle of Intersections

A right-angle intersection provides the shortest crossing distance for intersecting traffic streams. It also provides the most favorable condition for drivers to judge the relative position and speed of intersecting vehicles. Intersections shall be at a right angle (90 degrees) to the intersected roadway. The same rules will apply for intersection angles as would for road grade in terms of restriction distances. The roadway shall be restricted to a right angle for a distance as defined in the table, Restriction Distances for Profile and Alignment for the appropriate road classification. Intersection angle designs other than as described will be permitted only if approved by the County.

4.8.3 Intersection Sight Distance

In order to provide the opportunity for vehicles on a stop-controlled intersection leg to safely cross or make left or right turns onto a non-controlled intersection leg, adequate sight distance must be provided. Two sight distance triangles may be drawn to represent the areas which must be free of all objects, vegetation and topography in excess of two feet above the road surface below the driver's eye on the stop-controlled intersection leg. The AASHTO publication, A Policy on Geometric Design of Highways and Streets, identifies the acceptable means for determining the size of the sight distance triangles based upon many variables, including speed, width of the non-controlled leg, and other design factors. Each new road intersection or proposed modification of an existing road intersection shall be evaluated in accordance with the AASHTO sight distance design procedure.

The required stopping sight distance necessary, as measured from the traveling vehicle approaching the intersection on the through road, shall be determined according to the table, Minimum Stopping Site Distance. Note that the sight distance for a vehicle at the intersecting stop-controlled road is not the same.

Below is a table for sight distance relevant to the vehicle at the intersecting road entering or crossing the through road. It is to be used as a guideline and is included to show the distinction between the sight distances of the through road and the intersecting road. It also shows the affect of other variables on sight distance and the importance for their consideration for proper intersection design.

Sight Distances For Vehicles On Intersecting Roadways

Vehicle Type	Two Lane Through Road (ft / 10mph of posted speed)	Four Lane Through Road (ft / 10mph of posted speed)
car	100	120
single-unit truck	130	150
multi-unit truck	170	200

4.8.4 Intersection Return Radii

The intersection return radius is the distance as measured from the edge of the traveled surface of each of the respective intersecting roads to a common center of curvature, defining a curve between the two roadways. Note that for gravel roads, the traveled way is the road width exclusive of the shoulders.

The minimum return radius of a residential road shall be twenty (20) feet. For industrial or commercial areas or roadways, the minimum return radius shall be forty (40) feet.

4.9 Access Standards

Pursuant to Section 43-2-147(1), C.R.S., local governments are authorized to regulate vehicular access to and from any public roadway under their respective jurisdictions as well as from and to property adjoining the roadway.

It is the purpose of this section to provide the standards and procedures necessary to protect the public health, safety and welfare, maintain smooth traffic flow, maintain proper roadway drainage and to protect the functional level of the County road system while meeting state, regional, local and private transportation needs and interests.

Access to roadways is a form of a roadway intersection. As such, access design shall comply with all the relevant requirements defined in the Intersections section of the STANDARDS.

4.9.1 Implementation

No person shall construct any direct access to or from any roadway maintained by Delta County or from property adjoining the roadway without an approved access permit issued by the County.

4.9.2 Application For And Issuance of Permits

For a direct access to a County roadway, one will need to apply to the County Planning Department for a permit. In addition to the permit form, the County shall require all of the following items as part of the access application:

a. A site plan showing the location of the proposed access and the proposed improvements. The plan shall show all existing access locations to the site. All existing access to the County road by sites immediately surrounding the site of interest shall also be presented on the plan, including driveways and roadways. This will include access points on the opposite side of the County road of the site of interest.

b. Roadway and/or driveway plan and profile.

c. Drainage plan of the proposed access and its integration to any existing County drainage system.

d. Any proposed improvements, modifications, or structures within the County right-of-way.

Upon receiving a complete and acceptable application for an access permit, the County shall inspect the site and review the application and access design for site specific requirements for the construction of the access. Such requirements may include grade alterations, line of sight improvements, culvert or other drainage structure requirements, width of access specifications, and other necessary design factors. Once an application is acceptable and the design has been reviewed and determined by the County to be satisfactory, the application would then be approved and the access will be allowed for construction as defined in the application. Approval of construction does not grant access to a County roadway. Approval of the application only allows construction of an access to a County road.

Upon completion of construction of the access, the County shall inspect and issue the actual access permit if the access is deemed acceptable.

If construction of an access does not commence within one year of the date of application approval, the application shall become null and void.

4.9.3 Access Control Standards

It is the policy of Delta County by which direct access to the public road system shall be provided by the way of the lowest classified road possible. For example, no direct access shall be granted to a property from an arterial road when the property can be accessed from a collector or lower classified road. Similarly, no direct access shall be granted to a property from a collector road when the property can be accessed from a local access road. This may require an access design which is longer or less direct than other options in order to satisfy this requirement. Exceptions to this policy will be made only when it is demonstrated that a severe hardship would be caused to the property owner by strict enforcement of the policy, a hardship arising from the unique circumstances or characteristics of the particular site.

4.9.4 Access to Arterial and Collector Roads

When direct access is allowed to a Principal, Minor Arterial, or to Collector roadways, the following restrictions shall apply:

a. No more than one access approach shall be provided to an individual parcel or to contiguous parcels under the same ownership, unless it can be demonstrated that additional accesses would be beneficial to the safety and operation of the road system.

b. On two lane roadways, access approaches may be limited to only right-in and right-out turning movements if the access is within 500 feet of the nearest intersection.

c. No access shall be permitted within 300 feet of a median opening unless the access is directly aligned with the median opening.

d. No access configuration will be allowed that requires a vehicle to back out onto the roadway.

Intersections shall be spaced no less than one half mile apart on Principal Arterials and one quarter mile apart on Minor Arterials and Collectors, unless such spacing is impractical or impossible due to topographic or other physical limitations as determined by the County Engineer. Subdivisions should be designed to provide a future alternative access if that option exists.

4.9.5 Access to Local Access Roads

Roadway intersections shall be spaced no less than 150 feet apart.

4.9.6 Construction of Access

The expected dates of construction and use of the access shall be included on the application for the permit. The Applicant shall notify the County at least 48 hours (business hour time period) prior to any construction within the County right-of-way.

The construction of the access and its appurtenances as required by the terms and conditions of the permit application shall be the responsibility and are to be completed at the sole expense of the Permittee. Delta County will not supply materials or labor for the construction of the access or appurtenances.

All roadway access improvements including pavement, curbs, gutters, sidewalks, drainage structures, ditches and auxiliary lanes shall be within the County right-of-way. Any additional right-of-way required for such improvements must be dedicated or deeded to Delta County prior to construction beginning.

All roadway access construction which affects existing structures within the County right-of-way, such as pavement, curbs, gutters, sidewalks, drainage structures, ditches and auxiliary lanes shall be required to incorporate the existing structure as part of the final access design. For example, an access that intersects with an existing sidewalk will need to include acceptable transitional features to incorporate the intersection of the sidewalk to the access as part of an acceptable final access design.

4.9.7 Use of Access

Access permits are issued for a specific use or type of service. No change in the type of use or service may be made without the property owner applying for an amended access permit and securing approval from Delta County (example - from agricultural to residential would require an amended permit). Any change in the land use of the property served by the access which, in the opinion of the County, can be reasonably expected to result in a significant change in the volume or type of traffic using the access, may necessitate issuance of a new or amended access permit.

Any access, whether constructed before, on, or after the date of adoption of the STANDARDS, may be required by the County to be reconstructed or relocated to conform to the STANDARDS at the property owner’s expense if necessitated by a change in the use of the property which occurs after the adoption of the STANDARDS.

If the reconstruction or relocation of an access is necessitated by changes in road or traffic conditions, it will be at the expense of the County.

4.9.8 Unauthorized Access

Any access for which any of the following statements is true shall be considered an unauthorized access:

a. The access was installed without an access permit being issued.

b. The access was installed or is being used contrary to the terms and conditions of an approved access permit application or an issued access permit.

c. The land use of the property or the type of service for which the access is being used has changed significantly without an access permit or amended permit being granted.

Upon discovery of an access considered unauthorized under the terms of this section, the County will send written notice to the property owner by means of the United States Postal Service mail delivery with return receipt requested. The letter will be sent to the last known address of the owner as shown in the records of the County Assessor's Office. Should there be no response within a reasonable amount of time, a final notice will be sent by means of certified mail. The notice will include a description of all steps necessary to bring the access into compliance. If the property owner fails to bring the access into compliance within 30 days of the written notice, the County may, at its option, install barriers across or remove the access. Should this be required, it shall be at the sole expense of the property owner.

4.9.9 Access Drainage

The roadway drainage system is for the protection of the Delta County roadway and right-of-way. It is not designed or intended to serve the drainage requirements of abutting properties beyond the levels which have historically flowed to the County right-of-way.

All roadway access shall be constructed so they will not interfere with the existing drainage system of the roadway. Drainage structures that approach the County roadway should become an integral part of the existing drainage system. Such drainage structures shall impose erosion control methods to minimize silt, sediment, and debris from being introduced into the existing roadway system.

The maintenance of the drainage structure shall be the responsibility of the property owner. Reference 4.6, Roadway Drainage and specifically 4.6.2, Culverts for drainage requirement details. Length, diameter, cover, type, and inlet and outlet elevation of all drainage structures is subject to approval of the County.

Accesses should be constructed in such a manner that minimizes erosion and shall not result in deposition of silt and debris upon the County roadway. Accesses which slope down toward the public road will be constructed to include suitable means of assuring that water does not run onto or across the traveled public way. This may include crown, borrow ditches, pans or other methods along the access sufficient to direct water to the existing drainage facilities along the public road.

4.9.10 Driveways

Residential or private Driveways are a specific form of access to a County roadway. As such, all relevant requirements defined in the Access Standards section shall pertain to Driveways. Requirements found in this section will address the more specific nature of Driveways and shall be in addition to or will revise the Access Standards for the particular case of Driveway access.

Location, spacing and profile of Driveways shall be in accordance with Items 10 and 11 in Appendix 5. Examples of Driveway construction for urban and rural environments are also illustrated in Appendix 5 and are recommended designs for those situations. Also reference Section 4.5.3 – Construction Involving Significant Cuts or Fills for further Driveway profile restrictions and requirements.

Only one residential access per lot or parcel should be allowed. Should reasons be shown for safety, necessity, or extenuating circumstances, the County may allow more than one access.

Access for agricultural operations, as defined in Appendix 1, Definitions, would justify a need for additional allowable parcel access. The additional access shall be limited in number as shown by need and each access shall include a gate. The agricultural access shall be constructed to allow for the use of the gate without vehicular or equipment obstruction of the County road.

Below are requirements that shall apply to Driveway design:

a. Only one residential access per lot or parcel is allowed for a property frontage which is less than one hundred (100) feet.

b. If the Driveway is not paved, it shall be constructed as defined in the Appendix from the edge of the traveled surface to the right-of-way boundary line or for a minimum of ten (10) feet. Reference Appendix 5, Item 16.

c. If an unlined drainage ditch exists along the road to be accessed, the Applicant must supply and install a culvert pipe in the Driveway. The diameter of the pipe shall be a minimum of twelve (12) inches in diameter. The length of the pipe shall be such that the pipe inlet/outlet extends a minimum of twelve (12) inches beyond the surrounding embankment of the Driveway. The pipe will be bedded with a minimum of 6 inches of Class 6 aggregate base course material with a minimum of six (6) inches of cover over the pipe, compacted to 95% of standard Proctor density. Reference 4.6, Roadway Drainage and specifically 4.6.2 - Culverts for more elaboration on drainage requirements.

   If the roadside drainage ditch is too shallow to allow for a proper drainage system utilizing a twelve inch diameter culvert, a concrete cross pan shall be considered an acceptable option. The final design of the cross pan shall be subject to approval by the County Engineer. Reference Appendix 6 for further information on cross pan designs.

d. The Driveway shall slope downward and away at the same slope as the intersected road for a minimum of ten (10) feet. The Driveway alignment and grade profile at the approach to the County roadway shall meet the requirements defined in Section 4.7 – Intersections of the STANDARDS. Reference Appendix 5 for further information on Driveway profiles.

The following Driveway access shall not be allowed:

a. Within fifty (50) feet of the nearest right-of-way line of an intersecting non-arterial road;

b. Within one hundred (100) feet of the nearest right-of-way line of an intersecting arterial road;

c. Within one hundred (100) feet of an approved median opening location on an arterial road;

d. Within twenty five (25) feet of a guardrail terminus;

e. Within one hundred (100) feet of a bridge structure;

f. Within the minimum spacing as established by Item 10 in Appendix 5;

g. When adequate sight distance cannot be provided to vehicles on the Driveway attempting to access the road;

4.9.11 Access Appurtenances

An access approach that is gated shall be designed so that the longest vehicle using it can completely clear the traveled way when the gate is closed. In no event shall the distance from the gate to the edge of the traveled surface be less than thirty five (35) feet. Any overhead entry structures shall have at least a thirteen feet, six inches (13’ 6”) height as clearance measured from the access surface.

Mailboxes may be located in the public road right-of-way and shall not create a roadside hazard, obstruct or hinder vehicular or pedestrian traffic, or interfere with road maintenance activities such as snowplowing and weed mowing.

On roads that are designed to accommodate traffic volumes in excess of 2,000 vehicle trips per day, mailboxes shall be located at least 8 feet away from the edge of the traveled way. In high-density areas, group or cluster mailboxes may be required.

Installation of mailboxes should comply with the appropriate Items in Appendix 6, Roadway Appurtenances. Care and maintenance of the mailbox and immediate area are the responsibility of the property owner. This would include snow removal and vegetation control.

Wear, damage, or breakage to mailboxes, fencing, decorative items, signage, or any other appurtenances throughout the property roadside frontage due to thrown snow and inclusions from snow removal activities on a County maintained road will **NOT** be the responsibility of the County.

4.10 Utility Installation Standards

Any utility within a road right-of-way must be designed and located primarily to maximize public safety and secondarily to minimize road maintenance and snowplowing costs. All utilities requiring above-ground risers or boxes at intersections shall be a minimum of twenty-eight feet (28') from the centerline of all existing roads.

When a utility company must make an emergency repair of their equipment which involves cutting a County roadway to restore service, they may do so. The company shall notify the County within 48 hours and provide an acceptable road repair plan within one (1) business day to the County Engineer or County designee following notification. Reference Appendix 4 - Road Cuts and Repairs for information on proper road repair methods.

Acquisition of additional right-of-way for the installation of utilities is the obligation of the Permittee.

4.10.1 Installation

Where the installation crosses a paved roadway, it shall be made by boring or jacking beneath the road surface. Open cutting shall be allowed to the edge of the shoulder portion of the road. No water shall be used in boring and no tunneling shall be permitted. In no circumstance shall an existing culvert be used for an installation of a new underground utility.

Pavement cuts for installation are only permitted when approved in advance by the County Engineer. Such requests shall require a repair plan that is reviewed and approved by the County. All repairs are subject to final inspection and acceptance by the County and all expenses are the responsibility of the Permittee. See the Appendix – regarding Road Cuts and Repairs for further details.

The Permittee shall be responsible for roadway failure repair for a period of twelve (12) months after completion of the repair. Failure shall include surface patch failure and surface settlement. Corrections may be made by the County and billed directly to the Permittee. Under such circumstances, the County shall provide notice to the Permittee to properly complete the work within fifteen (15) days of notice or be subject to County action.

No cleated or track equipment shall work on or move over a bituminous surface or a magnesium-chloride treated surface without mats. Any damage to the roadway, roadway drainage, curbs, shoulders, sidewalks, or roadway appurtenances as a result of the installation or repair of utilities shall be the responsibility of the Permittee to repair.

No underground utility may be installed within a road right-of-way if such installation would interfere in any fashion with any existing utility installation or water course, including a corral, ditch or culvert, except with the prior written authorization of the owner of the existing utility installation or water course.

The Permittee shall be responsible for the complete reclamation of areas disturbed within the right-of-way to prevent the introduction or spread of noxious weeds and manage soil erosion.

In new construction, a sequence of installation from the deepest utility to the shallowest shall be required.

4.11 Roads Within Previously Dedicated Public Right-of-Way

There are numerous road rights-of way within Delta County which were created and dedicated to the public by subdivision plats that pre-date the present regulations (i.e. prior to August 1972). In many instances, the roads were never actually constructed or were constructed too poorly to be accepted by the County for maintenance. Instances arise where

a private property owner has no legal access to their property except over and across a platted, deeded or dedicated right-of-way in which no road exists. Delta County will not issue access permits for any property whose sole access is a public right-of-way not maintained by Delta County unless the Applicant desiring to use the right-of-way agrees to one of the following:

1. The Applicant shall apply for an access permit with a design to construct the road from the intersection with a maintained public road to a point along the frontage of the property to be accessed. The construction plan objective will be in compliance with the STANDARDS applicable to the road's functional classification. Upon completion and issuing of the access permit, application may be made to the Board of County Commissioners for acceptance of the road for maintenance by the County, if appropriate. Roadways built to the standards defined for a Public Use – Privately Maintained Road would not be appropriate for this request.

OR,

2. The Applicant shall apply to the Board of County Commissioners for a vacation of the public road right-of-way. Should the vacation of the road be granted, the Applicant wishing to use the resulting Private Road for the sole access to their property shall be allowed to apply for an access permit. The process for access application and permitting would then be the same as stated in the STANDARDS for the appropriate access classification, which in most cases would be for a Local Service Road.

4.12 Non-through Streets

Roadways that end without exiting onto a connecting roadway shall be provided with the necessary signage warning approaching through traffic of the no outlet nature of the roadway.

4.12.1 Cul-de-Sac Roads

A cul-de-sac is a road that serves more than one property owner and has only one intersection with the public road system. The following requirements apply to the creation by plat or deed of new cul-de-sac roads, both public and private. The length of a cul-de-sac is measured between the centerline of the intersecting road and the radius point of the cul-de-sac. A cul-de-sac road shall not be longer than 1,200 feet. Cul-de-sacs shall be designed to provide adequate snow storage.

4.12.2 No Outlet Roads

No outlet roads will be allowed only where a future extension of the road would be necessary to serve adjacent properties or provide access to roadway channelization when developed at a future date. When a no outlet road is allowed, a temporary turn-around shall

be provided. Temporary turn-arounds shall match the physical requirements for cul-de-sac roads and shall be provided with a temporary easement allowing for maintenance.

4.13 Roadway Appurtenances

4.13.1 Road Signs and Traffic Control Devices

All road signs, striping, delineators, barricades, signals, and other traffic control devices shall conform to the Manual on Uniform Traffic Control Devices (MUTCD) published by U.S. Department of Transportation, Federal Highway Administration, and any applicable Colorado supplement. All road signage shall also conform to the County's Uniform Addressing Standards for the relevant signs.

The Permittee shall be required to install all necessary signage and shall bear all expenses for the fabrication and installation of road name signs, permanent barricades, and signs for implementing the approved project design (i.e. one way, no parking, no outlet, stop sign, speed limit, etc.) Necessary signage shall include signs required on County roads as a consequence of the Applicant's project, such as regulatory, guide, or warning signs. Signs and barricades shall be in place prior to road acceptance.

4.13.2 Guard Rails

When guard rails are used in conjunction with roadside curbs, the face of the guard rail shall be flush with the face of the curb regardless of shoulder width. This is to prevent the take-off ramp effect which may turn a vehicle over. When no curb is present, the face of the guard rail shall be flush with the edge of the shoulder. Where pedestrians are expected to use the shoulder, a walkway should be provided around the end of the guard rail outside the normal shoulder line and guard rail installation.

When guard rails are required, reference CDOT'S Standard Specifications for Road and Bridge Construction, Miscellaneous Construction – Guardrail for guidelines on guard rail construction requirements and installation procedures.

Guidelines when guard rails shall be considered appropriate are provided below.

a. On curves requiring a reduction in approach speeds, the following conditions may require a guard rail on the outside curve:

    i. Height of embankment is more than 10 feet.

    ii. Side slopes are steeper than 4:1.

iii. Shoulder or pavement widths are substandard.

iv. Roadside hazards are present.

b. Where there is a history of roadway accidents which guard rails would help prevent or reduce the severity of the accident, guard rails shall be required.

c. In areas subject to dense fog, snow or icy conditions or where traffic speed and volumes are high, a guard rail may be justified where it would otherwise be questionable under less adverse conditions.

d. An obstruction or sudden constriction on width may require the installation of a guard rail.

e. An isolated sharp curve on a road otherwise built to higher standards may warrant a guard rail.

f. Guard rails may be needed at approaches to bridge piers, abutments, trees, or other obstructions.

g. A guard rail should be placed at the ends of all bridges on the right of approaching traffic.

4.13.3 Cattle Guards

Cattle guards shall be installed where they are necessary for the control of livestock. The clear opening of the cattle guard shall extend from the edge of the shoulder to edge of shoulder for the standard roadway section approved. Each cattle guard location shall also have a gate installed to allow livestock passage. Cattle guard and gate design shall be approved by the County Engineer prior to installation. Appendix 6, Items 8 and 9 − Typical Details, Cattle Guard shall define the expectations for acceptable design. The expense of the foundation design, fabrication and installation of cattle guards shall be the responsibility of the Permittee.

ARTICLE 5 – CONSTRUCTION POLICY STANDARDS

During the execution of road and bridge construction and related work, all materials, performance, and quality of work shall conform to the requirements of the STANDARDS, the applicable sections for the most current edition of the Department of Transportation, State of Colorado Standard Specifications for Road and Bridge Construction, Division of Highways M & S Standards, and the American Association of State Highway and Transportation Officials Standard Specification for Highway Bridges.

If the STANDARDS, the CDOT M & S Standards, or the AASHTO Standard Specifications for Highway Bridges do not cover a specific situation during the course of work, applicable specifications must be approved by or obtained from the County. In the event that there is conflict between the various reference specifications, they shall govern in the following order:

1. the STANDARDS

2. Department of Transportation, State of Colorado, Standard Specifications for Road and Bridge Construction; Division of Highways M & S Standards

3. AASHTO Standard Specifications for Highway Bridges

5.1 Control of Work

All work done within County road right-of-way and applicable work done on private property shall be inspected and documented by Delta County to ensure compliance with the STANDARDS, the approved plans and any subdivision improvements agreement. The County shall have the authority to control work as determined by the STANDARDS, judge the quality and acceptability of materials furnished or the work performed, or as to the rate of progress of the work and will have final say as to the interpretation of the approved plans. The County will use acceptable engineering techniques and prudent, professional judgment in the oversight and control of work.

The County Engineer shall have the authority to suspend the work in whole or in part. The following situations shall justify such action:

a. The failure of the contractor to correct conditions unsafe for the general public;

b. The failure to carry out provisions of the STANDARDS or approved plans;

c. The failure to carry out written or verbal instructions from the County as a result of items previously found to be unacceptable or unsatisfactory;

d. For periods of time due to unsuitable weather conditions;

e. For conditions considered unsuitable for the proper prosecution of the work;

f. For conditions or reasons deemed to be in the public interest or to protect the public health, safety and welfare.

All notifications of work suspension will be presented by the County in writing.

The County shall be authorize to take immediate corrective measures, to include repairs and alterations, should a condition exist where the consequence of work performed presents an significant and immediate threat to the public safety and well being. The expense of all corrective measures shall be the sole responsibility of the Permittee.

The Permittee will have the ability to contest County decisions regarding the control and suspension of work by appealing to the Board of County Commissioners.

5.2 Authority of the Inspector

The County shall be represented by a Construction Inspector, or other official as designated by the County, who is authorized to inspect all work done and materials furnished. The Construction Inspector shall not be authorized to waive any provisions of the STANDARDS or the approved plans, nor to issue instructions contrary to the STANDARDS or the approved plans. The Construction Inspector will not act as a foreman for the Permittee nor supervise or direct the work.

5.3 The Project Engineer's Responsibilities

The Project Engineer shall be the duly authorized agent of the developer and/or Permittee and has immediate charge of engineering details of the work. It shall be the responsibility of the Project Engineer:

a. To provide to the Construction Inspector any engineering details, documentation or any relevant information regarding the prosecution of the work.

b. To provide the Construction Inspector with regular and timely project progress reports, if required as part of the approved plans.

c. To provide to the County Engineering Department written approval for any proposed alterations to the approved plans and specifications before any such modifications are incorporated into the work.

d. To provide "as-built" plans to the County Engineering Department upon completion of all work to be performed on the project as a condition of final approval of the work.

e. To furnish and set construction stakes and marks establishing all lines, grades, and measurements necessary to the proper prosecution of the work in its final location as shown on the approved plans.

f. To provide all materials testing necessary to establish parameters required to inspect work for compliance with approved plans and specifications.

g. To stop earth fill work when frost levels reach four (4) inches.

5.4 Inspection and Testing

To ensure compliance with the STANDARDS and the approved plans, adequate in-progress inspection and testing is required. Expected test reports shall include all results from test pits, compaction tests and proof rolling. Reference the Appendix for testing details.

All materials and each part or detail of the work will be subject to the inspection of the Construction Inspector. The Construction Inspector shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Project Engineer as required, to accomplish a complete and detailed inspection.

When the construction specifications of other jurisdictions (such as CDOT or a municipality) are used to govern a portion of the work as part of the approved plans, written approval of that portion of work by all appropriate jurisdictions shall be provided and made available to the Construction Inspector prior to final acceptance of the work.

Regular in-progress materials testing shall be provided to the Construction Inspector in a timely manner during the course of the work and shall be a requirement of final acceptance. The interval of in-progress materials testing shall conform to the most current testing schedule established by the Colorado Department of Transportation, Materials Testing Section, Field Materials Manual, latest edition. A test plan for the project shall be provided and is subject to the approval of the County Engineer. As part of the test plan, all materials testing will be performed by an independent laboratory under the supervision of a Colorado licensed professional engineer at the expense of the developer or contractor. The Delta County Engineering Department may, at its option, perform such additional quality control testing, as it deems appropriate and necessary or desirable at its own expense.

Any work done or materials used without inspection or testing shall be subject to removal or replacement. The Construction Inspector may, at any time before acceptance of the work, direct the contractor to remove or uncover any portion of the finished work. After examination and approval of the work by the Construction Inspector, the Contractor shall

restore the portions of the work disturbed to the standard required by the plans and specifications.

Inspection by the County shall not relieve the developer and/or contractor or their designated representatives of the responsibility to control the work and insure compliance with the approved plans and specifications. The County shall not be responsible for insuring project compliance with the approved plans and specifications.

5.5 Removal of Unacceptable Work or Unauthorized Work

All work which does not conform to the STANDARDS or the approved plans will be considered unacceptable work − whether the result of poor workmanship, use of defective materials, damage through carelessness or any other cause found to exist prior to final acceptance of the work. Unacceptable work shall be subject to removal and restoration prior to acceptance of the work. Any work done contrary to the instructions of the Project Engineer or Construction Inspector will be considered unauthorized and shall be subject to removal and restoration.

Any work performed without approved plans and specifications will be considered unauthorized and shall be subject to removal and restoration.

Responsibility for the corrective measures along with all expenses attributable to unacceptable or unauthorized work shall be the sole responsibility of the developer or contractor.

5.6 Use of Approved Plans and Specifications

The approved plans, specifications, supplementary specifications, standards, supplementary standards and any special provision required or approved by the County shall be considered complimentary to describe and provide for complete work.

The Contractor shall not act to take advantage of any error or omission in the approved plans, standards and specifications. In the event an apparent error or omission is discovered, the Project Engineer and the Construction Inspector shall be notified, corrections will determined and corrective actions will be taken with the final approval from the County.

5.7 Acceptance of Work

5.7.1 Partial Acceptance

Immediately after component portions of work are completed, such as a section of the subgrade, structures, trench backfill, and other such intermediate roadway components, acceptance of this element may be required prior to proceeding with the next element of construction. The partial acceptance inspections shall be defined steps found in the inspection plan. An example would be acceptance of subgrade prior to the placement of subbase. The County's approval of partial acceptance shall be required before the next phase of work begins.

After partial acceptance of an element of work is issued, should conditions change due to the next phase not being constructed for a normally expected period of time, or should other circumstances warrant it, the County may require re-inspection for partial acceptance.

5.7.2 Final Acceptance

Upon written notice from the developer of the completion of all work, the Construction Inspector shall make a final inspection. If all project work is determined by the County to be in compliance with the STANDARDS, the approved plans, the performance guarantee and/or subdivision improvement agreement and all other complimentary plan documentation, the procedure for acceptance by the Board of County Commissioners for maintenance or release of the performance guarantee shall be initiated.

If the inspection discloses any work in whole or in part as being unsatisfactory or incomplete, the County shall notify the developer in writing of the deficient items. The developer shall reschedule a follow-up inspection upon completion of the corrective measures and the final acceptance process will be re-initiated. In the event the work is not complete, the developer is responsible for maintenance of the work until such time of final acceptance.